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REMARKS

ON THE

STRUCTURE AND FUNCTION

OF THE

MAMMÆ,

AND ON

MAMMITIS IN THE COW.

READ BEFORE THE

MEMBERS OF THE EDINBURGH VETERINARY
MEDICAL ASSOCIATION.

BY

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[Published at the request of the Members of the above Association.]

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PREFACE.

THE following Essay was sent to the press, not on account of the Author having any good opinion of its practical worth, but solely at the request of that Society before whom it was read and defended. It is also necessary to state, that at one of the Society's meetings (in order to advance its objects, and give stimulus to the Members to make endeavours to accelerate the progress of all the branches of Veterinary Science) it was determined to give a Prize Medal for the best weekly Essay, read and defended on any subject which the person might choose. The annexed Remarks were so fortunate as to be considered by the adjudicators the most deserving.

EDINBURGH VETERINARY COLLEGE,
SESSION 1842-43.

REMARKS, &c.

GENTLEMEN,

THE duty of bringing before your attention (according to the rules of our Association) a written Essay on some subject in connexion with Veterinary Science having this evening devolved upon me, although I embrace with pleasure the opportunity, yet I am free to confess that if any one of you has come to this meeting in the same spirit as the ancient Athenians and the strangers that were there, who were always desirous of hearing or of telling "*some new thing*," I am afraid that I shall not be able thus to administer to his gratification. It is to be remembered that our principal object is the obtaining of correct principles and practices in connection with our profession, which can be best done by our attention being chiefly directed to a collection of such facts and opinions as directly bear upon it, such as shall further our present intentions, and advance us in that improvement which I trust each and all of us desire. No one I think will be prepared to deny that the Cow is one of the most valuable and useful of our domesticated animals, and forms a great proportion of our agricultural property; that notwithstanding this, the diseases to which this animal is liable have not received that share of professional study and attention which they demand, and that a knowledge of these diseases and their treatment is absolutely necessary to be obtained by us before we can attain the summit of our wishes, by laying claim to the appellation of "VETERINARY SURGEONS." From considering these circumstances, as I have had some little practical experience of, and have devoted some little attention to the diseases of cattle, I have been induced to choose for the subject of the present essay one which, though sometimes attacking the mare, yet is of much more frequent occurrence in the milch cow—*i. e.*, an inflammatory state of the udder. This is an organ of the utmost importance in the animal economy, and, when deranged by disease, is prevented from furnishing us with three of the most useful, healthy, and well-known articles of food that we enjoy—I refer to milk, butter, and cheese. I hope, gentlemen, that you will, on these grounds, consider the present subject one that is worthy of our attention and discussion this evening. If another inducement were wanting to impress our minds with the relative advantages arising from a skilful treatment of a disease attacking this organ, I would mention the following as the last, and perhaps what would with some be the most weighty. You are well aware that it is an organ with which the FEMALE portion of our agriculturists have to do in performing the operation of milking, &c., and unless we initiate ourselves into their good opinion (which we cannot better do than by performing a cure in these cases), it will undoubtedly (from the influence that they can exercise over the opinions of the other sex) be a means of preventing us from being entrusted with the care of their sick horses as well as cows. This is a piece of policy the truth of which I have found out by experience, for I know that in the county of which I am a native, although the husband may be the master, yet in nine cases out of ten the wife does as she pleases.

With these preliminary observations, we shall now proceed to make some few remarks on the structure and functions of the Mammæ, in order that we may be better prepared to understand its true pathological state,—a knowledge of the one being intimately connected with correct opinions of the other.

The mammæ, or udders (commonly called the bag), are those large glandular bodies that are pendulous under the postero-inferior part of the abdomen, between the thighs, in their distended state reaching anteriorly within a few inches of the umbilicus, and posteriorly as far back as to be almost on a level with the tendons of the gastrocnemii muscles. The aptitude of this situation is sufficiently evident to us all as being most convenient for the calf, offering the least hindrance to progression, and being most securely protected from external injury. Of all the animals in the class "mammalia," none are possessed of mammiferous glands of such an immense magnitude (in proportion to the size of the animal) as the cow. I am not prepared to say whether or not the domestication of the cow, and the apparent perversion of the lacteal secretion from the use for which it was originally intended, may not in a great measure have contributed to the large size of this organ. One fact, however, would appear to contradict this opinion, and to prove rather that nature has not only intended them in this animal to furnish elementary food for the support and continuation of the mother's offspring, but also to answer other purposes, by supplying man with a highly nutritive and pleasant beverage,—from the well-known fact, that although the lactiferous secretion in most other animals very soon ceases after the withdrawal of their young, and along with them the maternal sympathy, yet, in the cow, the functions of this gland are not for a considerable time interfered with, even if it may *never* have been subjected to the great exciting cause of the secretion, the presence and suckling of its offspring. I may also mention that the size of the organ is various, depending upon the age, breed, and time of parturition, and also in a great measure upon the frequency of the demands made upon it for a supply of milk: the health of the animal, and the nutritious quality of the food, combined with other circumstances, will have a tendency to augment or lessen its volume. The period also at which this lacteal secretion for the first time commences is dependent upon circumstances,—some breeds as the French Alderney, and others being generally put to the bull from ten months to two years old. From three to five years of age is considered the time in which they are in the best note for milk. The average quantity of milk produced by a cow is from eight to twelve quarts per diem, although some will for a few months give eight or nine gallons in the same time. There is also, as is well known, a variety in the composition of the milk, some abounding in the butyrous, and others in the caseous principle,—what some are short in quantity, is made up by its superiority in richness of quality. This may be accounted for by constitutional peculiarities, or by the greater energy of the functions of assimilation. The chemical analysis of milk furnishes us with the following contents, according to Berzelius :—

Water	928.75
Curd, with some cream	28.00
Sugar of milk	35.00
Muriate of potash	1.70
Phosphate of potash	0.25
Lactic acid, acetate of potash, with a trace of lactate of iron	6.00
Earthy phosphates	0.30
	1000.00

Thus, we perceive that milk is a compound fluid of an aqueous, caseous, and oleaginous nature, a fact easily proved by the spontaneous decomposition which it undergoes when allowed to stand in a vessel. From the fact, also, of its containing substances which are found in the chyle and not in the blood, many physiologists (among whom we may mention the immortal Haller) have been led to infer that the materials of which it is composed are supplied to the mammæ from the chyle *by the absorbent system*. The resemblance, also, between the milk and the chyle may appear to favour this opinion. Many other hypothetical arguments are advanced in favour of this theory, but I think that the following statements are sufficient to prove it erroneous, and to establish the fact that the blood itself furnishes this (as well as all the other glands), with the requisite material for secretion:—1*st*, No anatomist has as yet discovered or described any lacteal vessels coming from the mesentery to the udder; 2*d*, Purgation of the suckling cannot be produced by any medicine administered to the mother, *unless this medicine is quickly absorbed into the circulation;* 3*d*, The fact of injections passing from the arteries into the excretory ducts of the glands; 4*th*, When the secerning powers of the gland have been exhausted, *blood* has been drawn from the teat; 5*th*, From analogical reasoning or deductions, we may infer that as nature does not frequently deviate from her usual laws for trifles, that the mammæ, with every other gland (the liver excepted) is furnished with material for secretion by the ARTERIES.

Previous to making any remarks on the function of secretion, it will perhaps be requisite just to glance at the general anatomical structure of the udder; and, beginning from without, notice first what we find *externally.* In common with the other parts of the body, the udder receives a covering of the common integument, but of such a character as to be able to adapt itself to the changes in size which the organ undergoes, being soft, pliable, elastic, and but partially covered by long and soft hair. In shape it is imperfectly hemispherical, and artificially divided (externally) by the skin into four quarters, and to each quarter hangs an appendix called the papillæ or teat, giving it very much the appearance of a round-surfaced funnel. If the quarters differ any in size, the two anterior are generally the larger.

The teat is an inverted cone, formed from a continuation of the covering of the udder, but having more cuticle on its surface, to prevent the effects of friction to which it is exposed from suckling or milking. Its dependent portion is contracted, and each teat is perforated by an opening that communicates with the interior of the gland. Some few muscular fibres also are found in its substance, which, together with a kind of valvular apparatus in its internal part, formed by the cuticle being continued up the sides of the perforation and then terminating in an abrupt or corrugated manner, where the contraction ceases, will assist in preventing the column of milk escaping spontaneously, which we sometimes have witnessed in large and full udders, the weight of the fluid overcoming this provision. Thus we perceive by what a simple and easily-formed contrivance *nature* manages to overcome what would to us be great obstacles, and what perhaps would have puzzled some of our best mechanics to have discovered—so simple, yet so effectual in its design.

Proceeding inwardly, and immediately under the skin, we find an intervening cellular tissue, uniting loosely but firmly the skin to an expansion of elastic fascia from the superficialis abdominis, by which the gland is enveloped, rendering it stronger and more compact. This fascia and cellular membrane also detach several portions into the interior of the glandular structure for the same purpose. In this glandular structure, as in other secerning organs, we find arteries, veins, nerves, absorbents, excretory ducts, a small portion of fatty matter, and cellular tissue ; but of the intimate arrangement and disposition of these various tissues but little is as yet known. The udder being a conglomerate gland is formed of numerous lobules united together by cellular membrane. Each of these lobuli is principally constituted of arteries, veins, and ducts, and though almost too small for demonstration, yet we infer that each lobule is a small gland that performs as perfect a secretion as the whole accumulated glandular mass. The minute structure and disposition of these lobuli has given rise to as much anatomical disquisition as that of the arrangement of the air cells in the lungs. Neither can we admit that microscopic investigation has placed us on a surer footing in this respect; in fact, the primary and essential modes in which all bodies are composed and arranged, is a subject beyond the grasp of the human intellect, however laborious, inquisitive, or penetrative its researches may be; and whatever unwillingness may be manifested by an interrogative aspirer prior to his subscribing an assent to the declaration—"thus far shalt thou go, but no farther"—still the simplest and most uncomplicated structure in the field of nature presents us with something inexplicable, if our inquiries are pushed to their furthest extent.

The question has frequently been put to me, Where or in what is the milk contained previous to its abstraction from the udder by the teat? The plebeian will tell us in the *milk veins!* And, to be candid, how many of us are there who did not in former years harbour this opinion, having (no doubt) received it by *tradition* in our youth? But when "philosophy throws away the veil that exists between nature and the ignorant," then false notions, however closely they may be clung to, must give way to those ideas obtained from our own examination and judgment of structure and function.

But lest you should charge me with flying off from my subject at a tangent, let me proceed to make some few remarks on those canals in the interior of the udder which contain the milk. No doubt you will recognise them under the name of *excretory ducts*, and it must at once strike you that they must be very numerous and capacious, in order to hold from 6 to 18 quarts of fluid. The interior of these lactiferous canals is lined by a mucous membrane, and the other portion of the tubes was thought by Hunter to be of a musculo-membranous texture, but I think we shall fail to trace any muscular fibre in their composition; and as the obtaining a flow of milk, whether by the suckling or the milk-maid, is by a purely mechanical process, we do not perceive that muscularity is at all essential. We do not deny that they possess contractility—the organ in its collapsed state sufficiently evinces this property.

These ducts are supposed by some to be continuous with the minute ramified terminations of the arteries that supply them with fluid ; by others, that between those terminations and the commencement of the ducts some structure is interposed, through which the blood is infiltrated and changed ; whilst it is the most general, and I think the most probable opinion, that in the parenchymatous substance of the organ are many areolæ or cells in the interior of which the arteries ramify and deposit the milk, which is conveyed by the excretory ducts into larger receptacles, with which the gland is furnished, whilst the superabundance of blood and the " residuum of secretion " are carried again into the circulation, the former by the veins, the latter by the lymphatic vessels. The shape and disposition of these excretory ducts are not unworthy of our notice. In shape they bear considerable analogy to the papillæ or teat. We previously noticed that the teat is so formed as to prevent the loss of milk by gravitation, but if there were no other provision against this, the weight of the accumulated fluid must inevitably overcome it. But nature always adapts her means to the desired end, and has in the interior so formed the canals as to resist the pressure from above, by the converging terminations of smaller into larger ducts, being, like the teat, contracted, and provided with a valvular fold of the lining membrane. The same law is also observed throughout, to the communication of the ducts with the teat. The canals do not, in an uniform manner, keep growing from smaller to a larger size, but in various parts of their course are considerably dilated in a similar manner to the varicose veins under the masseter muscle, or analogous to the vesiculæ seminales in the penis. These dilatations or sacs answer the purpose of reservoirs, have their inferior portions contracted, and are placed in an oblique direction, are provided with valves, thus preventing the accidental loss of milk, and also its retrogression. On this account it is necessary that the teat should be elevated, and the udder gently pushed upwards in the operation of milking, in order to open the valve, and dislodge the milk. Were some of our dairymaids to take a lesson from the calf or colt on this subject, and mark how they instinctively, and with pleasure to the mother, obtain the milk from the gland, we should not have so many vicious cows, so many diseased udders, or sore teats.

The principal arteries of the mammæ are two branches given off from the pudic, which curve round in the course of the perineum, and enter the posterior part of the gland, where they subdivide to ramify in its interior structure. There are other branches of less importance from the surrounding vessels, which anastomose with the epigastric. The veins are analogous in their course downwards and upwards. The lymphatics pass up to penetrate the inguinal glands, and the nerves are chiefly from the hypogastric plexus, with a supply from the surrounding filaments.

It is not my intention to make many remarks on the physiology of secretion. As physiologists (*who* EXPLAIN every thing) give us no less than a dozen theories on the manner in which a fluid is secreted, you will conclude that it is out of my power to tell you the "modus operandi" of a gland. I may state that by the term secretion we mean, a separation (from the blood) of an animal fluid, which differs in its character from the blood itself. But the question is, How or in what manner? Were we to enter into the discussion of this question, we should leave but little time for the consideration of the principal object of the essay, viz. an inflamed udder. We shall therefore content ourselves at the present by simply enumerating some of the theories that have been devised to answer the query. Some maintain that a fluid is separated by simple transudation from the artery; others by a sort of infiltration or by fermentation, or by a peculiar chemical process; whilst others have had recourse to electricity and galvanism, or to many of the above processes combined, to explain the function.—*Vide* Dr Milligan's Notes to Majendie's Physiology, p. 588, where nine theories are given. My own opinion is that the arteries pour out the *milk* into the *ducts*, in the same manner as they secrete the hoof of the horse's foot, *i. e.*, by simple filtration through the pores of the arteries. I will not further occupy your time by considering whether or not the elementary principles of every secretion are contained in the blood. Existence cannot proceed from non-existence; and as every organ is so arranged and disposed as to perform its own specific function, it is no more a matter of surprise to find the arteries of a gland pouring forth a fluid very different in its properties from the blood, than that bone should be eliminated by the arteries of the bone. Without entering further into this intricate subject, allow me to conclude this section by saying that the inexplicable laws by which the functions of the animal economy are carried on and regulated, will (in my opinion) for ever render it impossible for physiological science to attain that perfection which we find even in the metaphysical sciences.

Having now very briefly (and I fear but imperfectly) run over the general anatomy and physiology of the udder, we shall be better prepared to consider it when in a morbid condition. Although there are few organs in the body more liable to disease than glands, yet how few pages in our veterinary pathological works do we find devoted to their consideration? The reason why we do not see a larger number of these cases, may arise from glands being but low in the scale of sensibility, not receiving a large supply of sensitive nerves, thus preventing the animal from manifesting symptoms of pain. We have frequently seen the liver, spleen, and other glands almost disorganized in consequence of previous disease, and yet the animal has never been noticed to evince the effects of pain. Inflammation of the udder (or, as it is commonly designated), '*garget*,' is a disease of frequent* occurrence in milch cows, most commonly sudden in its attack, rapid in its progress, and often productive of irreparable injury. It may have its seat in the glandular or cellular structure, but frequently involves both these as well as their cutaneous covering. The symptoms are these ordinarily produced by inflammatory action, and are so palpable as scarcely to require mentioning. We shall find heat, swelling, and pain, with derangement of function in the gland, and not unfrequently more or less constitutional disturbance. The disease generally commences in one quarter of the udder, which becomes hot, enlarged, and has a peculiar hard and knotty feel. But as inflammation is very apt to spread where there is continuity or contiguity of membrane, the other quarter, or perhaps the whole udder, becomes involved. The milk is considerably reduced in quantity, and of a yellowish colour by the admixture of serum and lymph, which becomes coagulated, and gives it that curdled appearance so often witnessed in these cases. As the disease advances, we shall find that the secretion of milk is entirely suspended, and that in its place blood, lymph, or pus, is effused in the interior of the lactiferous tubes. When the cellular texture is chiefly involved, we shall find considerable tension of the skin in consequence of effusion having taken place in the cells, and very often in these cases there is œdema of one or both of the posterior extremities. In other cases, the skin will exhibit indications of erysipelatous inflammation, appearing red, and the redness temporarily disappearing on pressure being applied to the surface by the finger. The swelling and consequent tension are not to a great degree prior to the vessels unloading themselves by effusion, which they may do on both surfaces. After this has taken place, the redness and acute inflammatory action ceases, and then the skin assumes a yellowish tint. But when the internal structure of the gland is affected, it is by far the most dangerous in its consequences, and the most difficult to treat. With the local inflammation we have always more orless constitutional or sympathetic fever, varying in intensity according to the degree of nervous and vascular excitement caused by the local irritation. We may also notice that the subcutaneous abdominal or milk veins are generally distended, the return of the venous blood being impeded in consequence of the swelling.

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* I venture to disagree with Mr Blaine, who says it is not of common occurrence.

It may be observed that cows yielding a large supply of milk are most liable to this disease, and it has taken place in heifers, from being in too high condition, even previous to their ever having given any milk, and cows whose udders have been dry for months are not exempt. The causes of this complaint are numerous, and it is very often complicated with the epizootics that prevail in some seasons of the year, and in certain localities. No doubt many of us would remark this, in the pustular affection of 1839 and 1840. Those animals also that were improperly treated for this epizootic, were frequently some few weeks afterwards attacked with inflammation of the udder. We shall divide the causes into those that place the organ in a state of susceptibility for the attack, and hence called the *predisposing*, and those that are the immediate agents in its production, generally called the *exciting*. Amongst the former, constitutional plethora, the result of high feeding, is perhaps the most frequent.

I have seen the disease attack cows from being put into too luxuriant a pasture, either soon after the suspension of lactation, or when near the time of parturition, and particularly those that are unaccustomed to the climate. Neglect of abstracting the milk, or the operation being performed in an improper manner, may also be included. The sudden commencement of the secretion, or what is called the "springing" of the milk, calling for a large influx of blood into the vessels, or badly drying up the gland, and leaving portions of milk to be absorbed into the system are frequent causes. Exposure to cold and wet in the field, cold currents of air coming in contact with the animal in the cow-house,—the animals standing with their legs or udder in a pit when drinking, may also induce the disease. The exciting causes are external injuries, such as the viscus being gored by another cow's horn; being kicked or trodden upon when standing or lying in the cow-house; bruising the udder by lying carelesly upon it; having too little straw in the shippen, and thus exposing the gland to the hard and cold stones or flags, or by lying out in the autumn, amongst cold and wet grass. Permitting the udder to be loaded and distended by an accumulation of milk, and the practice of "hefting" are frequent causes. I once saw the disease produced by a youth being in the habit of inserting straws in the teat to draw off the milk. Professor DICK also mentions that it may result from cow-pox. Disease of the teat and obstruction of its perforation, by not allowing the milk to flow, but to lodge in the ducts, which will act as an irritant, and produce inflammation, in the same manner as retention of urine causes cystitis. From the well-marked sympathy between the udder and the uterus, the irritation caused in the latter by the retention of the placenta, will frequently extend to and involve the former in disease. Derangement of the maniplies and abomasum, or of any portion of the alimentary canal, will frequently cause disease of the udder. In fact, it appears to me that the causes inducing an inflamed state of this important viscus, are far more numerous than have generally been supposed by what few authors have written on the subject.

Garget assumes both an acute and a chronic character, and this distinction will to a certain extent modify the nature and application of our remedies. It may terminate in resolution, suppuration, obliteration by condensation and induration of the glandular structure, and in gangrene. But properly speaking, these cannot be called its ultimate terminations (with the exception of the first), but rather as consequences—as the inflammatory action may still be existent in some of the surrounding portions of the gland, whilst there is suppuration and mortification in the other. Restoration and death, in my opinion, are the only two ultimate terminations of disease.

The *treatment* must at all times be moderated by the nature and intensity of the symptoms exhibited, and will in a great degree be influenced by the cause that originated them. We must first endeavour to discover whether there is any immediate exciting cause still in operation, as the lodging of thorns, or of splinters of wood, accumulations of milk, or obstructions to its flow, and our first indication will be to remove these. If the udder be distended with milk, let it be withdrawn either by gentle manual operation, by permitting the calf to suckle, or if these give the animal much pain, by the introduction of a mechanical apparatus in the form of the teat canula, or the tubular portion of a common quill, into the teat, through which the milk will gradually gravitate. The removal of these exciting causes simply, will very speedily produce a mitigation of the symptoms, and afford the animal considerable relief. In some parts of our empire, from some popular *belief*, or perhaps *disbelief*, the farmer refuses to draw off the secretion before the parturition of the cow, although the udder may some time previously have been distended, almost to bursting; but this must be insisted upon, or bad consequences are likely to follow its neglect, and if the function of secretion is very vigorous, let the fluid be more frequently abstracted. On the same principle, any offensive or irritative matter in the uterus must be removed; and if the stomach or digestive canal be suspected, let them be regulated by cathartics, tonics, or stimulants, as circumstances may require. If, after having got rid of the exciting cause, or if its removal cannot be effected, the inflammatory action proceeds unabated, we must have recourse to decided antiphlogistic measures. Of these the ancient practice of venesection stands the foremost, and is absolutely necessary when the local inflammation and the constitutional disturbance are great. In this case we shall probably find the animal with a quick pulse, laborious respiration, anxious countenance, costive bowels, diminished appetite, suspended rumination and lactation, and manifesting general nervous excitement and great pain.

According to the violence of these symptoms must be the energy and extent of our general treatment, in order to check their rapid progress, and to prevent their fatal consequences. No law can be laid down as to the exact quantity of blood that circumstances may render it necessary to abstract,—the general symptons, the state of the *pulse*, the general plethora of the vascular system, the age, strength, &c., &c., of our patient, must be considered as guides on this point. It is the effect, and not the quantity of blood that we wish to obtain. From four to eight quarts may be stated as the general quantity required, taking care that it is abstracted in a full and free stream, in order that we may make an impression on the force and activity of the circulation, by giving it a sudden check, and prevent the vascular system accommodating itself to the gradual loss of blood drawn by a small orifice, which reduces the bodily strength, whilst it does not alleviate or prevent the determination of blood to the suffering organ. It is of no importance which vessel we choose for this purpose, the jugular or the subcutaneous abdominal vein; but I give a preference to the former, having in many instances found a difficulty in pinning up the latter after the operation, and also, from the looseness of the integument, the cellular membrane under the abdomen is very liable to sanguineous infiltration from the orifice of the vein. As there is congestion or determination of blood in an inflamed part, it would be advisable, if *practicable*, to detract blood locally from its immediate vicinity. This is generally done by leeches, scarifications, or incisions; but unless in those cases where the inflammation is superficial, as in the cellular membrane or skin, we do not see the propriety of their use. Incisions through the integument in a longitudinal direction have been of service where the skin is principally involved, when there is much tension and subcutaneous serous effusion. By this means the distended vessels are unloaded, the serous effusion evacuated, the tension relieved, and the disease is gradually drained away by the suppurative process which follows. But we would only recommend incisions after other local and constitutional remedies have failed. Blood-letting must be followed by the administration of a cathartic, the importance of which in cattle practice is well known. The following is the formula we generally adopt:—Magnes. sulph. ℔ j. vel ℔ jss., flor. sulph. ℥ iiij., sem. carui. et pulv. zingib. ăă ℥ ij , mixed in a quart of warm water, to which may be added a little molasses, to render the drench less irritating to the superior part of the air passage. If there be obstinate constipation, the purgative effect may be increased by the addition of 10 or 20 grains of croton. By these means we shall not only cause evacuation of the fœcal contents of the intestines, but also get rid of a large portion of the thinner part of the blood by secretion and excretion, stimulating the functions of the liver and skin, restoring the balance of the circulation by determining blood from that organ which already possesses too much, to other parts of the body, and will be an important adjunct with blood-letting in lessening the morbid susceptibility of the diseased part, and in promoting a healthy state of the organ.

In the subsequent treatment sedatives, tonics, or diuretics may be given, according to the degree of fever or debility that may supervene; but it will seldom be found requisite to do more than keep the bowels in a regular state by small aperient doses, or if we cannot keep for some time a depressed state of the circulation, 2 or ʒ iij of extract of belladonna may be given daily, or occasional doses of digitalis nitre and tartar emetic, followed by the vegetable tonics on the remission of the symptoms, or at the accession of debility. Muriate of soda is objectionable as a medicine in this disease, as it has a greater tendency than other *cathartics* to retard the secretion of milk.

After having combated the constitutional symptoms (if any), our next object must be to remove the local inflammation, for which purpose we use direct applications to the part itself. Amongst these, hot fomentation is perhaps the most *beneficial*, where the inflammation is fully established in its acute form. It may either be with water as hot as a person can bear his hand in, and the temperature kept up, or the water may be medicated to suit the fancy of the proprietor,—as it is the heat and moisture which are of utility in allaying the irritation, by relieving the deeper seated nerves from pressure, causing cutaneous transpiration, relaxing the vessels, and promoting effusion. If that benefit does not arise from this remedy which is expected, it is frequently because the fomentation is not persisted in a sufficient length of time, or for want of water of sufficient heat. Four times in the course of the day, and an hour each time, should the application be made,—having a large vessel, continually supplied with water of a proper heat, placed under the cow, and a person on each side of the udder, who, with a large woollen cloth dipped into the water at intervals, and applied to the udder, so as not only to foment, but to suspend it. A poultice of bran or linseed may then be applied, but are rather objectionable on account of their weight. The udder may also be suspended by a broad bandage passing from beneath it to the loins, with a slip posteriorly between the hind legs, to meet the other at an angle. This will assist in relieving the pain, and prevent the weight of the udder causing such an increased determination of blood to the part. I would not recommend any stimulating application until the violent inflammatory action has somewhat abated by the preceding treatment, which may be repeated, or carried to its fullest extent, as circumstances may require. After the more active stage has been somewhat subdued, a cooling liniment may be rubbed on the udder after the fomentations. Any of the following may answer:—Acetate of lead, ʒ ij.; water, 1 pint; neat's-foot or olive oil, 1 pint;—shake, when a saponaceous fluid will be formed. This I have found to answer well in many cases. Solutions of the acetate of lead, of nitre, or of sal ammoniac, in water, with vinegar or spirits of wine added, are often made use of, according as a cooling, evaporating, or discutient lotion may be wanted. Ointments are also recommended by some practitioners, but are more applicable to a chronic stage, as the friction necessary for inunction will tend to irritate a glandular swelling in its acute form. They may be used where stimulants are required, in order to remove the stagnated blood, by rousing the dilated vessels into action. Camphorated elder ointment, with a little mercurial ointment added, is recommended by Mr Youatt. Camphorated spirits, with oil of origanum, or olive oil, turpentine, and camphor, or lime water, linseed oil, and spirits of turpentine, in varied proportions, will form liniments that may be well rubbed in, when the tenderness of the part is removed, but swelling remains. As I live on the sea-coast, I have been in the habit of using decoctions of sea-weed (commonly called tang) in sea-water, and have found it of use in removing the swelling left after an acute attack. Perhaps it may act on the absorbents, from the portion of iodine that the sea-weed contains. Iodine ointment is a good application.

We must not forget to have the udder emptied of its contents two or three times in the day, by being milked, if there is no obstruction, or much tenderness in the teat. If the latter be the case, the tube already mentioned had better be used, as the disease may be increased by the irritation of milking by the hand, caused in the diseased teat. It will sometimes be found necessary to make a longitudinal incision into the teat, in order to remove coagulated milk or blood from the termination of the ducts, which may be done by the introduction of a probe. Some excise the teat altogether, but this practice is seldom required, and should be avoided if possible, as it renders milking very inconvenient, and either lessens or totally stops the secretion from that quarter. The animal should be kept as quiet as possible, and have thin gruel, malt, or bran mashes, with a little sweet hay, and chilled water. If, however, all the means to which we have resorted should fail in producing what is most to be desired—resolution of the inflammation—the attack may proceed unsubdued, and produce suppuration, abscess, gangrene, or even death itself, by the violence of the symtomatic fever. If the swelling, fever, and pain increase, the bleeding and purging may be renewed, and the fomentations continued, if the animal can bear further depletion. In some cases large effusions of serum will take place, and form anasarcous tumours in the vicinity of the udder, or immediately under the integument enveloping it. These must be evacuated by the lancet, and treated by emollients in order to induce suppuration. Setons, also, may be inserted in the surrounding parts, which may cause revulsion, and act as drains. If the discharge from the udder be great, debility may be the consequence, when recourse must be had to gruel, port wine, and the vegetable tonics, or if there is no debility, diuretics may be of service.

Suppuration frequently takes place either in the subcutaneous cellular tissue, or more commonly in the interior of the glandular structure, at the central part of the consolidated lymphous deposit from the vessels, which causes that hard and knotty feel of the udder under inflammation. When superficially seated, the presence of pus may soon be detected by its naturally tending to the surface: we must not permit its spontaneous evacuation, but give free vent by a dependent incision with our lancet or bistoury, and thus leave a clean-edged wound, which may afterwards be treated by mild stimulants, or have a little lint interposed to keep the edges from adhering and again pinning up the pus. It may afterwards be treated by astringent washes or injections. But when suppuration takes place in the interior structure, it is often productive of serious results; being deeper seated, pus does not readily reach the surface, but burrows in various directions, by means of the lymph forming canals around the circumference of the pus, called sinuses. These sinuses may be numerous, and ramify in various directions through the inner structure, and three or four empty themselves into one, which, on attaining the surface, bursts and discharges a purulent unhealthy matter. The existence of these sinuses, and the constant discharge (which must be great from many of them) soon weakens the animal and disorganizes the udder. The fistulous ulcers thus formed, or those formed by the bursting of the abscesses, are difficult to heal, and should if possible be prevented by allowing previous evacuation to the matter by the lancet at that point in which it is preparing to burst. If, however, the case has been neglected, if abscess, sinuses, and ulcers have formed, from the danger of gangrene, and from the weakening of the constitution, we must have recourse to antiseptics and tonics, and endeavour to obtain a healthy action of the parts by the application of a solution of the chloride of soda or lime. We may insert a piece of caustic potash in the sinuses, or inject them with a solution of corrosive sublimate, in order to obliterate their canals and suppress the unhealthy secretion. Should this treatment succeed, it invariably leaves the gland in an indurated state, and stops further secretion from the quarter which was affected. In some cases, where the intensity of the inflammation is such as to cause a complete stagnation of blood, and consequent stoppage of circulation through the vessels, the part, from want of nutrition, loses its vitality or mortifies. The affected portions will become cold, black, insensible, and have a fœtid smell. Incisions may be made into it with a sharp instrument, but no blood flows, and the animal evinces no pain. Large sloughs are occasionally detached and fall off, while the surrounding parts are soon all involved if its progress is not immediately checked. This can only be done by the removal of the dead and dying portions by a surgical operation. In performing this operation the principal objects to be borne in mind are—1*st.* To remove every portion of the dead part. 2*d.* To leave a sufficient quantity of integument, so as to allow the edges to be brought together by suture. 3*d.* Properly to prevent bleeding by securing the mammary arteries by ligature, and some other smaller branches by ligature or torsion. The nature of the incision will depend upon the extent of disease, and the after treatment will consist in supporting the parts by a bandage, and in keeping up the strength of the animal as much as possible by the means we have already mentioned, keeping the wound clean by simple water dressing, and promoting adhesion or granulation according to the indications presented. This is the only means, under these circumstances, of saving the animal's life, and of giving the owner time to make her serviceable by feeding for the knife. This operation has been successfully performed by Professor Dick and by Mr Bowie of Hawick, N.B., and by other veterinary surgeons.

We have now but a few remarks to make on chronic inflammation of the udder, and on one of the consequences of the acute, viz., induration of the gland. The chronic inflammation is but a sequel of the acute; there is little or no pain, generally swelling and hardness, but no heat. The milk is lessened in its quantity, the animal's appetite diminished, but little or no constitutional disturbance is present.

If not removed the secretion of milk gradually and slowly ceases, and the affected portion is called a " blind pap." It is often very difficult to restore it from this chronic and indolent state to its wonted vigour, although much success has attended the use of iodine. and its compounds. It is a very useful application to glandular enlargements when of long standing, and is the most to be depended upon in induration of the udder. It is used both internally and externally. For external use ℥ij of the tinct. iodine mixed with ℥ij soap liniment will form an embrocation, or ℥j of the iodine to an ounce of lard will form an ointment which, if well rubbed on the diseased part, with plenty of friction, will frequently succeed in causing absorption of the tumours. The iodine in ʒss doses, or diniodide of copper ℥ij may be given internally. A respectable authority recommends the internal administration of hydriodate of potash. I have given it both to the cow and horse in ʒiv doses, without any other than a diuretic effect. If this is the effect that is wanted, we have better and cheaper diuretics in our pharmacopeia. I also think (and that from experience) that the ointment of hydriodate of potash is far inferior to those made from iodine itself, or from some of its compounds with mercury. In chronic garget the use of these remedies must be continued twice in the day, and often for a considerable time, before any benefit is derived, taking care that we do not cause absorption of the gland itself.

The induration of the affected quarter or quarters is a very frequent consequence of garget, in which case we have obliteration of the functions of the gland, with the restoration of the animal's health. This is produced by a cessation of the inflammation, and a subsequent consolidation of the cellular and secreting textures of the gland. It is seldom of a malignant nature, like carcinoma, but remains stationary and indolent throughout the animal's life, producing no irritation in the surrounding tissues. When this is the case, no treatment is necessary, as it is impossible to discuss it.

If the tumour, however, should put on a malignant character, which it sometimes does in consequence of being roused by external injury, in which case renewed inflammation is set up in the surrounding parts of the adventitious deposit, which had hitherto been harmless, now spreads with rapidity, and involves the other structures, which become converted into a substance like itself. Ulceration and suppuration frequently supervene, and if the whole malignant substance is not removed by operation, death must inevitably result from the great excitement of the system. But as this is not a common result, we look upon induration as that consequence of inflammation most to be desired after resolution. It detracts from the value of the animal as a milch cow in proportion as one or more of the quarters are thus affected, but it does not prevent her from being consigned as a feeder. I may also mention that numerous instances are known of those quarters of the udder thought to have been thus obliterated again secreting after a succeeding parturition ; but I think that another quarter more frequently becomes dry, than that one in this state again resumes its function.

I may remark that inflammation of the udder is frequently called in Scotland " a weed," and in England, when from constitutional causes, a shake, chill, or shivering fit. There are also cases in which the lymphatic vessels are chiefly involved from some obstruction in the inguinal or other glands, when we shall find the swelling in the posterior extremities I have already referred to. There will be but little variety in the treatment of this, and of acute inflammation already mentioned. I shall therefore not occupy your time further by entering into its detail.

I have now, gentlemen, briefly run over the general points in connexion with the structure, function, and inflammation of the mammæ. If I have treated my subject in a dissatisfactory manner, I crave your indulgence, as it is a topic on which few wells present themselves out of which I might have drawn. If I have succeeded in calling your future attention to the study of an important morbific affection in one of the most useful organs and animals under the care of man—if I have been the means of conveying the least information on the subject to a single *individual* present, or of stirring up the minds of others by the way of remembrance—I shall feel myself amply repaid for the trouble that has been expended in the composition of the foregoing essay.